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Gaming guru

Computer science professor sought after AI consultant

Research

BY SUSAN FLANAGAN

What happens when artificial intelligence meets video games?


We get better solutions to real-world challenges.

AI interface

This summer, Dr. David Churchill, an assistant professor in the Department of Computer Science in the Faculty of Science, worked with **Blizzard Entertainment** and **Google DeepMind** on the creation of a new artificial intelligence (AI) interface for **StarCraft 2**.



Dr. Dave Churchill

 PHOTO: MIKE RITTER

The game is a followup to StarCraft, the best-selling real-time strategy game of all time.

Scientific test environment

In StarCraft players act as military commanders, giving orders to large armies in an attempt to destroy their in-game opponents. While at battle, the players make rapid-fire decisions, inputting up to 6-8 commands a second on special gaming keyboards.

“StarCraft was one of the pioneering games in the rise of e-sports,” said Dr. Churchill, who received a 2017 Discovery Grant from the Natural Sciences and Engineering Research Council of Canada (NSERC).

“It was as big as baseball in South Korea at the height of its popularity.”

The fact StarCraft is so complex is what enables scientists to use it as a test environment to research new state-of-the-art AI techniques that can be applied to real-world challenges.

‘Way of telling’

Researchers have been using games to test and develop AI systems for years, having already beaten the human world champions at games like chess and poker.

Now, the StarCraft 2 interface that Dr. Churchill worked on allows AI research to be done in the newer version of the game, something that both fans and academics alike have been waiting on for a long time.

“The day that we released the new software, people were already using it and giving us feedback.”

— Dr. David Churchill

To successfully conduct AI research, investigators need to evaluate if new techniques are more intelligent than previous ones.

StarCraft provides the perfect venue to do that. Games work well because they have a clear metric for evaluation: one player wins, and the other loses.

“In the past few years, StarCraft has become popular among academia as well as industry as a test-bed for new AI techniques, with companies such as Facebook, Microsoft and Google DeepMind actively doing AI research in the game,” said Dr. Churchill.

“Ever since we started working with the original StarCraft in 2009, people have wanted to do AI research in the newer StarCraft 2, and now that is possible. The day that we released the new software, people were already using it and giving us feedback, which is a great feeling.”

Several advantages

Games like StarCraft are also good for evaluating AI because they are easy to implement: you can set up a research environment quickly and the infrastructure costs are low.

“In many ways, the properties of StarCraft mimic the real world.”

— Dr. David Churchill

Complex video games like StarCraft have additional challenges over traditional board games, such as the need to make decisions in real-time, multi-unit control and the need to deal with hidden information.

“In many ways, the properties of StarCraft mimic the real world, so we can use it to test AI that we want to work in the real world,” explained Dr. Churchill.

“For example, in StarCraft, before you can defeat your opponent, you need to plan out how to first gather resources, construct a base and build and train your army. We call this a “build order.” Players have to make economic decisions on production and scheduling that mimic decisions made in real-life companies.”

Apps such as Google Maps or Siri for iPhone use the same type of path-planning algorithms that are present in modern video games. StarCraft can also be used to research machine learning, which has applications in areas such as language translation, image recognition and health care.

Educational benefits

Video games are not only powerful research tools, they are also education ones.

“Games are by far the best educational motivator I’ve ever seen,” said Dr. Churchill. “It’s amazing how motivating they can be. When I tell my class that we’ll be using video games in the course, they actually put down their cellphones and start listening.”

Memorial’s computer science department has recently introduced a new program stream in visual media and games that has several new courses focusing on video games and AI in the hopes that it will attract more students to the program.

“Students entering the program may know nothing about computers at first, but by the end they will be designing and making their own video games,” said Dr. Churchill.

“I feel like I’m the luckiest person in the world to be able to research and teach video games. I got my first video game system when I was 6 years old, and have been hooked ever since.”

This year, the international StarCraft AI Competition to showcase the best AI systems in the world is being held at Memorial for the first time. Organized and run by Dr. Churchill, competitors have until October to send him their code. For more information, visit the website.

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